CLAIMS

What is claimed is:

1. A positioning device for aligning and guiding first and second mold halves together, comprising;

a first member defining an alignment axis and having a male portion,

a second member separable from said first member and defining a female portion for mating with said male portion along said alignment axis to align the first and second mold halves together,

said male portion presenting a first bearing surface and said female portion presenting a second bearing surface,

a bearing mechanism for reducing friction along said bearing surfaces when mating said members together along said alignment axis as said bearing mechanism moves between first and second positions relative to at least one of said members, and

a resilient member for resiliently supporting said bearing mechanism between said first and second positions.

2. A positioning device as set forth in claim 1 wherein said bearing mechanism includes a cage having a bottom wall, a first pair of columns extending from said bottom wall, and a second pair of columns extending from said bottom wall and spaced from and parallel to said first pair of columns.

3. A positioning device as set forth in claim 2 wherein said bearing mechanism further includes a first plurality of needle bearings rotatably supported between said first pair of columns and a second plurality of needle bearings rotatably supported between said second pair of columns wherein said first and second pluralities of needle bearings are equidistant from said alignment axis.

4. A positioning device as set forth in claim 3 wherein said male portion of said first member is slidable within said cage along said alignment axis and between said first and second pluralities of needle bearings.

5. A positioning device as set forth in claim 4 wherein said bearing

mechanism further includes a retaining pin having a body portion coupled to said cage and a head portion adjacent said body portion.

6. A positioning device as set forth in claim 5 wherein said resilient member is further defined as a spring surrounding said retaining pin and having first and second ends for resiliently supporting said cage between said first and second positions.

7. A positioning device as set forth in claim 6 wherein said second member defines a first bore having a first diameter and said body portion of said retaining pin is slideably disposed therein.

8. A positioning device as set forth in claim 7 wherein said second member defines an annular chamber surrounding said first bore and said first end of said spring is disposed in said annular chamber about said retaining pin and said second end of said spring abuts said bottom wall of said cage about said retaining pin.

9. A positioning device as set forth in claim 8 wherein said second member defines a second bore adjacent to said first bore and having a second diameter greater than said first diameter of said first bore with said head portion being slidably disposed in said second bore.

10. A positioning device as set forth in claim 9 further including a fastener coupling said body portion of said retaining pin to said bottom wall of said cage.

11. A positioning device as set forth in claim 10 further including a pair of reinforcement walls extending between said first and second pairs of columns.

12. A positioning device as set forth in claim 10 wherein said first and second members are further defined as first and second side locks and said first side lock comprises a unitary body having a main body portion with said male portion extending therefrom to form a generally T shape and said main body portion defines two counterbores perpendicular to said alignment axis for mounting said first side lock to the

first mold half and said second side lock comprises a unitary body having a generally U shape and defining two counterbores perpendicular to said alignment axis for mounting said second side lock to the second mold half.

13. A positioning device as set forth in claim 10 wherein said first and second members are further defined as first and second rectangular locks and said first rectangular lock comprises a unitary body having a generally T shape and defining two counterbores parallel to said alignment axis for mounting said first rectangular lock to the first mold half and said second rectangular lock comprises a unitary body having a generally U shape and defining two counterbores parallel to said alignment axis for mounting said second rectangular lock to the second mold half.

14. A positioning device as set forth in claim 10 wherein said first and second members are further defined as first and second top locks and said first top lock comprises a unitary body having a main body portion with said male portion extending therefrom to form a generally T shape and said main body portion defines two counterbores parallel to said alignment axis for mounting said first top lock to the first mold half and said second top lock comprises a unitary body having a generally U shape and defining two counterbores parallel to said alignment axis for mounting said second top lock to the second mold half.

15. A positioning device as set forth in claim 6 wherein said first member defines a first bore and said body portion of said retaining pin is slidably disposed therein.

16. A positioning device as set forth in claim 15 wherein said first member defines an annular chamber and said first end of said spring is disposed in said annular chamber about said retaining pin and said second end of said spring abuts said bottom wall of said cage about said retaining pin.

17. A positioning device as set forth in claim 16 wherein said first member defines a second bore adjacent to said first bore and having a second diameter greater

than said first diameter of said first bore and said body portion is slidably disposed in said second bore.

18. A positioning device as set forth in claim 17 further including a fastener for coupling said retaining pin to said bottom wall of said cage.

19. A positioning device as set forth in claim 18 wherein said first member is further defined as a top guide block and said second member is further defined as a pair of bottom guide blocks spaced from one another to define said female portion therebetween whereby said spring is coupled to said top guide block to resiliently support said cage in mating engagement with said pair of bottom guide blocks.

20. A positioning device as set forth in claim 18 wherein said first and second members are further defined as first and second side locks and said first side lock comprises a unitary body having a main body portion with said male portion extending therefrom to form a generally T shape and said main body portion defines two counterbores perpendicular to said alignment axis for mounting said first side lock to the first mold half and said second side lock comprises a unitary body having a generally U shape and defining two counterbores perpendicular to said alignment axis for mounting said second side lock to the second mold half.

21. A positioning device as set forth in claim 18 wherein said first and second members are further defined as first and second rectangular locks and said first rectangular lock comprises a unitary body having a generally T shape and defining two counterbores parallel to said alignment axis for mounting said first rectangular lock to the first mold half and said second rectangular lock comprises a unitary body having a generally U shape and defining two counterbores parallel to said alignment axis for mounting said second rectangular lock to the second mold half.

22. A positioning device as set forth in claim 18 wherein said first and second members are further defined as first and second top locks and said first top lock comprises a unitary body having a main body portion with said male portion extending

therefrom to form a generally T shape and said main body portion defines two counterbores parallel to said alignment axis for mounting said first top lock to the first mold half and said second top lock comprises a unitary body having a generally U shape and defining two counterbores parallel to said alignment axis for mounting said second top lock to the second mold half.

23. A positioning device as set forth in claim 6 wherein said first member is further defined as a top guide block and said second member is further defined as a pair of bottom guide blocks spaced from one another to define said female portion therebetween whereby said spring is coupled to one of said mold halves to resiliently support said cage when mating said top guide block with said pair of bottom guide blocks.

24. A positioning device as set forth in claim 9 further including a third member defining a female portion wherein said first member includes a second male portion for mating with said female portion of said third member.

25. A positioning device as set forth in claim 24 further including a second bearing mechanism interposed between said first and third members and a second resilient member for resiliently supporting said second bearing mechanism between first and second positions.

26. A positioning device as set forth in claim 25 wherein said first, second, and third members are further defined as first, second, and third side locks and said first side lock comprises a unitary body having a generally cross shape and a main body portion defining two counterbores perpendicular to said alignment axis for mounting said first side lock to the first mold half and said second and third side locks each comprise a unitary body having a generally U shape and defining two counterbores perpendicular to said alignment axis for mounting said second side lock to the second mold half and mounting said third side lock to a third mold half such that said first and second side locks align and guide the first and second mold halves together and said first and third side locks align and guide the first and third mold halves together.

27. A positioning device for aligning and guiding first and second mold halves together, comprising;

a first member defining an alignment axis and having a male portion,

a second member separable from said first member and defining a female portion for mating with said male portion along said alignment axis to align the first and second mold halves together,

a cage separable from said first and second members and engagable by said first and second members, and

a plurality of needle bearings rotatably supported by said cage for reducing wear of said members when mating said members together along said alignment axis.

28. A positioning device as set forth in claim 27 wherein said cage includes a bottom wall, a first pair of columns extending from said bottom wall, and a second pair of columns extending from said bottom wall and said plurality of needle bearings are further defined as a first plurality of needle bearings rotatably supported between said first pair of columns and a second plurality of needle bearings rotatably supported between said second pair of columns.

29. A positioning device as set forth in claim 28 further including a spring resiliently supporting said cage.